

THE JOHNSON COMPANY, INC.

**Environmental Sciences and Engineering**

2/13

February 11, 1997

Mr. Richard Spiese  
Waste Management Division, Sites Management Section  
Vermont Department of Environmental Conservation  
103 South Main Street  
Waterbury, Vermont 05671-0404

Feb 12 11 03 AM '97

Re: Soil and Groundwater Investigation, Northern Star/Burke Mountain Ski Area;  
East Burke, Vermont  
JCO #3-0208-1 (054)

Dear Richard:

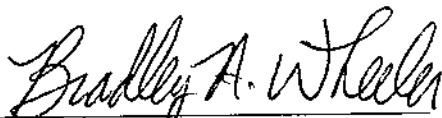
The attached report is submitted to you for your review and comment. The work described in the report includes a follow-up investigation of an underground storage tank (UST) removal, and site work pursuant to a Phase II Environmental Site Assessment. The UST closure report and an Expressway Notification form were submitted to Tim McNamara of the UST Program in November 1996.

Please call if you have any questions regarding any of the information provided in the report.

Sincerely,

THE JOHNSON COMPANY, INC.

By:



Bradley A. Wheeler, CPSS  
Senior Scientist

attachment

cc: Dixi Nohl, Northern Star/Burke Mountain Ski Area (without attachment)

Reviewed By: ERH  
I:\PROJECTS\3-0208-1\SPIESE.297 February 11, 1997 BAW

# **Report**

**December 1996**

FEB 12 11 03 AM '97

## **Phase II Environmental Site Assessment, Closure of Two Underground Storage Tanks and Additional Soil and Groundwater Investigations**

**Northern Star/Burke Mountain Ski Area  
East Burke, Vermont**

**Prepared for:**

**NORTHERN STAR SKI CORPORATION  
P.O. Box 247  
East Burke, Vermont**

**THE JOHNSON COMPANY, INC.**  
*Environmental Sciences and Engineering*

100 State Street, Suite 600  
Montpelier, Vermont 05602  
802.229.4600/Fax 5876

THE JOHNSON COMPANY, INC.

***Environmental Sciences and Engineering***

December 31, 1996

Mr. Dixi Nohl, General Manager  
Northern Star/Burke Mountain Ski Area  
P.O. Box 247  
East Burke, Vermont 05832

Re: Phase II Environmental Site Assessment and Underground Storage Tank Closures and Assessment. Northern Star/Burke Mountain Ski Area; East Burke, Vermont  
JCO # 3-0208-1 (054)

Dear Mr. Nohl:

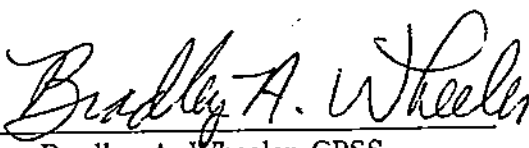
The Johnson Company, Inc. has completed the Phase II Environmental Site Assessment (ESA) and closures of two underground storage tanks (UST) at the Northern Star/Burke Mountain Ski Area in East Burke, Vermont. The purpose of the ESA was to determine if soil or groundwater contamination was present at locations previously described as "at risk" in a 1991 Phase I ESA completed by The Johnson Company. The UST closures were conducted in order to upgrade the fuel storage operations at the Northern Star/Burke Mountain Ski Area, and to comply with the Vermont Underground Storage Tank Regulations. Based on evidence of a release of gasoline from one of the closed UST, additional site investigation was conducted in this area to determine the extent of the soil and groundwater contamination.

The attached report describes the work activities, provides the data and results obtained, and presents The Johnson Company's conclusions and recommendations for the site based on those results.

Please call if you have questions regarding any aspect of this report.

Sincerely,

THE JOHNSON COMPANY, INC.

By:   
Bradley A. Wheeler, CPSS  
Senior Scientist

cc: Dan Yates, Lyndonville Savings Bank

Reviewed by: ERH

## TABLE OF CONTENTS

|  |    |
|--|----|
| 1.0 INTRODUCTION .....   | 1  |
| 2.0 SITE ACTIVITIES .....  | 2  |
| 2.1 PHASE II ENVIRONMENTAL SITE ASSESSMENT .....   | 2  |
| 2.1.1 <u>Snow-making Building</u> .....  | 2  |
| 2.1.2 <u>Poma Platter Ski-lift</u> .....   | 7  |
| 2.2 UNDERGROUND STORAGE TANKS .....  | 8  |
| 2.2.1 <u>Underground Storage Tank Assessments</u> .....  | 8  |
| 2.2.2 <u>UST Closures</u> .....  | 10 |
| 2.2.3 <u>Soil and Groundwater Investigation of Former Location of 500-gallon Gasoline Underground Storage Tank</u> ..... | 11 |
| 3.0 CONCLUSIONS AND RECOMMENDATIONS .....  | 15 |
| 3.1 PHASE II ENVIRONMENTAL SITE ASSESSMENT .....   | 15 |
| 3.1.1 <u>Snow-making Building</u> .....  | 15 |
| 3.1.2 <u>Poma Platter Ski Lift</u> .....   | 16 |
| 3.2 UNDERGROUND STORAGE TANKS .....  | 17 |
| 3.2.1 <u>UST Investigations</u> .....  | 17 |
| 3.2.2 <u>3,000-gallon Diesel UST Closure</u> .....   | 17 |
| 3.2.3 <u>500-gallon Gasoline UST Closure</u> .....   | 18 |

## LIST OF TABLES

Former 500-gallon Gasoline UST Area, Summary of Groundwater Analytical Data

## LIST OF FIGURES

Figure 1 - Site Location Map

Figure 2 - Site Sketch, Snow-making Building Area

Figure 3 - Site Sketch, Former Gasoline UST

## LIST OF APPENDICES

Appendix A Laboratory Analytical Report

Appendix B UST Closure Forms and Assessment Report

## 1.0 INTRODUCTION

The Johnson Company conducted a Phase II Environmental Site Assessment (ESA) and closures of two underground storage tanks (UST) at the Northern Star/Burke Mountain Ski Area in East Burke, Vermont during October, November and December, 1996 (See Figure 1, Site Location Map). The purpose of the ESA was to determine if soil or groundwater contamination was present at locations previously described as "at risk" in a 1991 Phase I ESA completed by The Johnson Company. The UST closures were conducted in order to upgrade the fuel storage operations at the Northern Star/Burke Mountain Ski Area, and to comply with the Vermont Underground Storage Tank Regulations (VT UST Regulations). Due to soil contamination present in the area of one of the closed UST, a soil and groundwater investigation was conducted to determine the degree and extent of the contamination.

The work completed by The Johnson Company includes the following tasks:

### A. Phase II Environmental Site Assessment

1. Collection of soil samples near the snow making building where visual evidence of contamination was present. These samples were screened for volatile organic compounds using a photoionization detector (PID).
2. A soil and groundwater investigation of the area adjacent to the snow-making building.
3. Collection of soil samples at the base of the Poma platter ski-lift where visual evidence of contamination was present. These samples were screened for volatile organic compounds using a PID.
4. Excavation and assessment of the soil contamination detected near the snow making building and the base of the Poma platter ski-lift.
5. Assessment of the condition of a 3,000-gallon diesel UST and a 10,000-gallon #2 fuel oil UST and screening of the soils around and under these UST to determine if leaking from either UST was evident. Soil samples collected from under and beside these UST were screened for volatile organic compounds using a PID.

## B. UST Closure and Site Investigation

1. Permanent closure of a 500-gallon gasoline UST and the 3,000-gallon diesel UST, in accordance with the requirements set forth in the VT UST Regulations.
2. A soil and groundwater investigation of the area near the former location of the 500-gallon gasoline UST, where soil contamination was evident during the closure assessment for this UST.

The following is a presentation of the methods used in carrying out the tasks listed above, the results obtained from these tasks, and the conclusions and recommendations of The Johnson Company that are derived from those results.

## 2.0 SITE ACTIVITIES

### 2.1 PHASE II ENVIRONMENTAL SITE ASSESSMENT

#### 2.1.1 Snow-making Building

On October 30, 1996, Mr. Bradley A. Wheeler, Senior Scientist of The Johnson Company, conducted a preliminary investigation to determine if soil contamination was present at three locations near the snow-making building where oily appearing stains were evident (See Figure 2). Prior to the collection of any soil samples, a Thermo Environmental Model 580B organic vapor meter PID was calibrated using zero air and 100 parts per million (ppm) isobutylene calibration gas.

Soil samples were collected from the west end of the building where a valve from the snow-making piping has apparently released oily water onto the ground surface. Three samples were collected from this location, at depths of 0 to 3 inches (SS-1), 9 to 12 inches (SS-2), and 26 to 30 inches (SS-3). The upper sample was heavily stained, and this stained appearance and dead vegetation covered an area of about two by four feet. The sample from 9 to 12 inches deep also was visibly stained, and the deeper sample was not visibly stained.

The soil samples were placed into resealable plastic bags and were agitated. After the sampling near the snow-making building was completed, the samples were taken into the

building where they were agitated again and the probe of the PID was inserted into the air space in the bag. The results of the plastic bag headspace PID screening were:

|                 |                           |
|-----------------|---------------------------|
| 0 to 3 inches   | 2 parts per million (ppm) |
| 9 to 12 inches  | 17 ppm                    |
| 26 to 30 inches | 63 ppm                    |

It was not possible to advance the hand auger deeper than 30 inches, due to stony subsurface soil conditions.

Two soil samples (SS-4 and SS-5) were collected from locations along the north side of the building (the side facing the roadway and pond) where it appeared that oil released from the generators inside the building may have leaked under the wall and onto the soils beside the building. The evidence for this presumption was staining on the slab of the building that extended to the junction with the soils beside the building. The soils at these locations did not produce any evidence of contamination. The PID screening (conducted as described above) results for these samples were both below 1 ppm. Readings of less than 1 ppm are often seen in clean, moist soil samples, due to the on-going organic matter decomposition in the soils.

To further investigate the nature of the contamination described above, a backhoe was used to excavate the soils between the auger boring at the west end of the snow-making building and the pond north of the building. The investigation of this area by backhoe excavation was limited by the proximity of below ground high-voltage electrical lines, telephone lines and air intake piping. An excavation was completed approximately 18 feet from the visually stained area described above. This excavation was slightly west of being directly between the visually stained area and the snow-making pond that is north of the snow-making building. Soil samples were collected at four depths in this excavation, and each was screened for volatile organic compounds using the PID headspace screening method used for all other soil samples collected as part of this Phase II ESA and UST removal project. The results of this screening were:

| <u>DEPTH</u> | <u>SOIL DESCRIPTION</u>                  | <u>HEADSPACE RESULT</u> |
|--------------|--|-------------------------|
| 2 feet bgs   | gray gravelly fine sandy loam, moist     | 70 ppm                  |
| 3.5 feet bgs | gray gravelly fine sandy loam, moist     | 56 ppm                  |
| 4.5 feet bgs | gray gravelly fine sandy loam, moist     | 35 ppm                  |
| 7 feet bgs   | gray gravelly fine sandy loam, saturated | 8 ppm                   |

Based on the results of the sampling from this excavation, and the history of this area, which includes use as a location for an outdoor fuel oil-burning air compressor, it was determined that the most appropriate and effective manner in which to investigate the nature and extent of this contamination would be to conduct soil borings and install groundwater monitoring wells to measure the extent of the soil contamination and potential impact to groundwater.

This additional investigation was carried out on November 27, 1996, when five soil borings (SB-6 through SB-10) were completed in the area of the snow-making building (See Figure 2). The purpose of these borings was to further characterize the soil contamination in this area described previously in this report and to determine if the groundwater in this area has been adversely impacted. To investigate the possibility of groundwater contamination, groundwater monitoring wells were installed into three of the soil borings (SB-6/MW-104, SB-8/MW-105, SB-10/MW-106).

The soils throughout this area are primarily gravelly loamy sand. Generally, the depth to the groundwater table in this area at the time of the investigation was approximately 5 feet bgs.

Tri-State Drilling and Boring of West Burke, Vermont was the drilling contractor hired to complete the drilling and well construction. As each boring was conducted, soil samples were collected at intervals of five feet. These soil samples were screened for volatile organic compounds using the PID headspace screening method used for all other soil samples collected as part of this Phase II ESA. The results of this screening are presented below:



| <u>BORING #</u> | <u>DEPTH (ft.)</u> | <u>SOIL DESCRIPTION</u>              | <u>HEADSPACE RESULT</u> |
|-----------------|--------------------|--------------------------------------|-------------------------|
| SB-6            | 1-3                | gray fine sandy loam, moist          | 46 ppm                  |
|                 | 5-7                | gray fine sandy loam, mottled, moist | 5.4 ppm                 |
|                 | 10-12              | brown gravelly loamy sand, saturated | 19.6 ppm                |
|                 | 15-17              | brown gravelly sand, saturated       | 2.8 ppm                 |
| SB-7            | 1-3                | grayish brown fine sandy loam, moist | 1.8 ppm                 |
|                 | 5-7                | brown gravelly loamy sand, saturated | 1.4 ppm                 |
|                 | 10-12              | brown gravelly sand, saturated       | 1.2 ppm                 |
| SB-8            | 1-3                | gray loamy fine sand, moist          | 85 ppm                  |
|                 | 5-7                | brown gravelly loamy sand, saturated | 52 ppm                  |
|                 | 10-12              | gray gravelly loamy sand, saturated  | 33 ppm                  |
| SB-9            | 1-3                | gray gravelly loamy fine sand, moist | 2.8 ppm                 |
|                 | 5-7                | gray gravelly sand, saturated        | 1.8 ppm                 |
|                 | 10-12              | brown gravelly loamy sand, saturated | 1.4 ppm                 |
| SB-10           | 1-3                | brown loamy fine sand, moist         | 2.0 ppm                 |
|                 | 5-7                | brown gravelly loamy sand, saturated | 1.8 ppm                 |
|                 | 10-12              | gray loamy fine sand, saturated      | 1.4 ppm                 |

The three groundwater monitoring wells were installed in soil borings SB-6 (MW-104), SB-8 (MW-105) and SB-10 (MW-106). Each well is constructed of 2" diameter PVC, with a 10-foot long screened section with 0.01-inch slots. The top of each well is slightly below the ground surface, and each well is covered with a protective steel "road box".

Monitoring well MW-104 is located approximately 33 feet east of the west end of the snow-making building, approximately 20 feet north of the north wall of the building. The bottom of the well was set at a depth of 15 feet bgs. A sand pack was installed around the screened section, from one foot below the well to a depth of 2.5 feet bgs. A bentonite seal was installed above the sand pack to a depth of 1 foot bgs. The protective road box was cemented into place above the bentonite.

Monitoring well MW-105 is located approximately 10 feet west of the west end of the snow-making building, approximately 19 feet north of the north wall of the building. The bottom of the well was set at a depth of 12 feet bgs. A sand pack was installed around the screened section, from one foot below the well to a depth of 1 foot bgs. A bentonite seal was installed above the sand pack to a depth of 0.5 foot bgs. The protective road box was cemented into place above the bentonite.

Monitoring well MW-106 is located approximately 18 feet west of the west end of the snow-making building, approximately 1.5 feet south of an imaginary line extending west from the north wall of the building. The bottom of the well was set at a depth of 13 feet bgs. A sand pack was installed around the screened section, from one foot below the well to a depth of 2 feet bgs. A bentonite seal was installed above the sand pack to a depth of 0.8 foot bgs. The protective road box was cemented into place above the bentonite.

Groundwater samples were collected from monitoring wells MW-104 and MW-105 on December 6, 1996. Monitoring well MW-106 had been damaged by heavy equipment some time between November 27 and December 6, making sample collection from this well impossible. The samples were collected using disposable bailers, and were placed on ice in a cooler immediately after collection. The samples were delivered to Green Mountain Laboratory in Middlesex, Vermont where they were analyzed for aromatic hydrocarbons using Environmental Protection Agency (EPA) Method 8020 and for total petroleum hydrocarbons using EPA Method 8100.

The reported results of the laboratory analysis for the groundwater samples from these two monitoring wells were that none of the listed analytes for either analytical method were detected above the practical quantitation limits specified for each compound. A copy of the laboratory analytical report is attached as Appendix A.

### 2.1.2 Poma Platter Ski-lift

On October 30, 1996, four soil samples were collected from a location under the gearbox at the base of the Poma platter ski-lift south of the Mid-Burke Lodge. At this location, the upper inch of the soils were visibly stained, and the soil from one inch to ten inches was a brown gravelly sand that was not visibly stained. At ten inches below the ground surface (bgs), a buried surface layer was encountered that was visibly stained for a thickness of several inches. Soil beneath this layer was gray and exhibited a distinct petroleum-like odor. Refusal (a large stone or bedrock) was encountered at 32 inches.

As with the soil samples collected from near the ski-making building, these samples were analyzed using the plastic bag headspace PID screening method. The results of this screening were as follows:

|                 |          |
|-----------------|----------|
| 0 to 2 inches   | 20 ppm   |
| 10 to 12 inches | 6.4 ppm  |
| 20 to 24 inches | 15.1 ppm |
| 28 to 32 inches | 13.8 ppm |

To further investigate this area of soil contamination, it was determined that a backhoe excavation would be conducted. The soil contamination at the base of this ski-lift is in a position directly adjacent to the downslope side of a concrete footing that supports the bottom tower of this ski-lift line. There is a tremendous amount of pressure being exerted on the tower by the cable that extends hundreds of feet up the mountain. After carefully analyzing the construction of this tower, it was determined that an excavation near the down-slope side of this tower footing would open the potential for collapse of the tower due to the tension being exerted on the cable. To excavate this area would have meant that the footing itself would have been exposed, with no support from the surrounding soils. For this reason, the soils in this area were not excavated as planned.

It is important to note that the soil contamination in this area is from past releases of gear-box oil, caused by leaking equipment or maintenance practices that have been discontinued for many years. This lift is approximately 40 years old. The gear-box was recently rebuilt and the previous leaking has been corrected, and the maintenance practices that are used for this equipment are designed to avoid releasing oil to the ground. Given the relatively low mobility of this heavy oil, and the relative lack of volatile components, we believe that the contaminated soils this area are best left in place, in order to avoid structural damage to the ski-lift tower. No sensitive receptors are threatened by this release of gear-box oil.

## 2.2 UNDERGROUND STORAGE TANKS

### 2.2.1 Underground Storage Tank Assessments

The three UST on the Northern Star/Burke Mountain Ski Area property were considered for possible closure. These included a 500-gallon gasoline UST, a 3,000-gallon diesel fuel UST, and a 10,000-gallon #2 fuel oil UST. Prior to the initiation of this work, it had been determined that the 500-gallon gasoline UST would be removed so that the gasoline storage for the ski area could be relocated to a preferred location in an above ground storage tank. Our investigation included performing assessments of the other UST to determine if there was evidence of leaking associated with these UST.

On November 4, 1996, the Northern Star/Burke Mountain Ski Area backhoe was used to excavate beside the 3,000-gallon diesel UST and the 10,000-gallon #2 fuel oil UST to assess the condition of the UST and the soils beside and under the UST. Mr. Mark Marinelli of Northern Star/Burke Mountain Ski Area operated the backhoe for this UST assessment. Mr. Wheeler was present to direct the excavation activity and conduct the UST and soil assessment. Soil samples were screened using the same method as described above in Section 2.1.1. The objective of this assessment was to determine if evidence of petroleum products was present around these UST. If such evidence was present, then the UST would be removed, as described later in this report.

Four soil samples were collected from the north end of the 3,000-gallon diesel UST, starting from approximately one foot above the bottom of the UST, and extending to a point approximately one foot beneath the UST. The PID headspace screening results from these samples increased with each progressively deeper sample, as follows:

- 5 ppm at one foot above the bottom edge of the UST
- 8 ppm at six inches above the bottom of the UST
- 11 ppm at slightly under the UST
- 16 ppm at approximately one foot beneath the UST.

In order to investigate the possibility that the contamination seen in these samples came from surface releases above the UST, soils were screened at the upper edge of the UST, where readings of less than 1 ppm were obtained.

Based on these data, which indicate that releases of diesel fuel have occurred from this UST, it was determined that this UST would be removed in accordance with the VT UST Regulations.

Excavations were conducted along one side and at both ends of the 10,000-gallon #2 fuel oil UST. By sloping back the sides of the excavation to make entry into the pit beside the UST safe from side-wall collapse, it was possible to obtain soil samples from under the west end and under the south side of the UST. Because there was not room to slope back the excavation at the east end of this UST, due to the proximity of the Sherburne Base Lodge building, soil samples at the east end of the UST were collected from directly beside the UST at depths to below the bottom of the UST, but not from directly under the UST itself. Groundwater was not encountered during this UST assessment.

Approximately 20 soil samples were collected from beside and under this UST. Three samples from beside the west end of the UST provided PID readings of between 2 and 4 ppm, but all other samples provided readings of less than 1 ppm. The small area from which PID readings of between 2 and 4 ppm were obtained may be indicative of a previous spill of fuel oil, that possibly occurred during filling of the UST. This information does not indicate that the UST itself is leaking. The data obtained from this UST assessment suggest that this 10,000-gallon UST is not leaking.

### 2.2.2 UST Closures

The 500-gallon gasoline UST and the 3,000-gallon diesel fuel UST were removed on November 12, 1996. Great Northern Environmental Services of Bath, New Hampshire was hired to excavate, clean and remove the UST. The Johnson Company conducted the environmental assessments required by the Vermont Underground Storage Tank Regulations. In summary, the soil conditions associated with the 500-gallon gasoline UST caused us to recommend additional characterization of the degree and extent of contamination in this area. This additional characterization is described in detail in Section 2.2.3 of this report.

The soil conditions encountered adjacent to the 3,000-gallon diesel fuel UST were relatively free of diesel fuel contamination, and no additional site characterization was recommended for this location. No contaminated soils were excavated for either on-site polyencapsulation or off-site treatment.

For a more complete description of these UST removals, see the Underground Storage Tank Permanent Closure Form and assessment report in Appendix B.

### 2.2.3 Soil and Groundwater Investigation of Former Location of 500-gallon Gasoline Underground Storage Tank

On November 26, 1996, five soil borings (SB-1 through SB-5) were completed in the area of the recently removed 500-gallon gasoline UST (See Figure 3). The purpose of these borings was to further characterize the soil and possibly groundwater contamination in this area described previously in this report. To investigate the possibility of groundwater contamination, groundwater monitoring wells were installed into three of the soil borings (SB-1/MW-101, SB-4/MW-102, SB-5/MW-103).

The soils throughout this area are consistently loamy fine sand over sandy clay loam at a depth ranging from six to 11 feet bgs. Generally, the depth to the groundwater table in this area where the UST was previously located was approximately 2.5 feet bgs, but in monitoring well MW-1, which is approximately 85 feet north (downslope) of the former UST location, the groundwater was approximately 8 feet bgs. A steep drop in slope occurs within approximately 25 feet north of MW-1, so this sharp increase in the depth to groundwater at this location appears to be consistent with the landscape.

Tri-State Drilling and Boring was the drilling contractor hired to complete the drilling and well construction. As each boring was conducted, soil samples were collected at intervals of five feet. These soil samples were screened for volatile organic compounds using the PID headspace screening method used for all other soil samples collected as part of this Phase II ESA. The results of this screening are presented below:

| <u>BORING #</u> | <u>DEPTH (ft.)</u> | <u>SOIL DESCRIPTION</u>                    | <u>HEADSPACE RESULT</u> |
|-----------------|--------------------|--|-------------------------|
| SB-1            | 5-7                | brown gravelly fine sandy loam, moist      | 0.3 ppm                 |
|                 | 10-12              | dark gray loamy fine sand, wet, mottled    | 0.3 ppm                 |
|                 | 15-17              | gray sandy clay loam, wet-saturated        | 0.3 ppm                 |
|                 | 20-22              | gray sandy clay loam, saturated            | 0.3 ppm                 |
| SB-2            | 1-3                | brown gravelly loamy sand, dry             | 0.3 ppm                 |
|                 | 5-7                | brown loamy fine sand, moist, mottled      | 0.3 ppm                 |
|                 | 10-11              | grayish brown loamy fine sand, wet         | 0.3 ppm                 |
|                 | 11-12              | gray sandy clay loam, wet-saturated        | 0.3 ppm                 |
| SB-3            | 1-3                | brown gravelly loamy sand, dry             | 0.3 ppm                 |
|                 | 5-7                | gray brown loamy fine sand, moist, mottled | 0.3 ppm                 |
|                 | 10-11              | grayish brown loamy fine sand, wet         | 0.3 ppm                 |
|                 | 11-12              | gray sandy clay loam, wet-saturated        | 0.3 ppm                 |
| SB-4            | 5-7                | gray brown loamy fine sand, moist, mottled | 0.3 ppm                 |
|                 | 10-12              | gray sandy clay loam, wet                  | 0.3 ppm                 |
| SB-5            | 5-6                | gray brown loamy fine sand, moist          | 130 ppm                 |
|                 | 6-7                | gray sandy clay loam, wet                  | 41 ppm                  |
|                 | 10-12              | gray gravelly sandy clay loam, saturated   | 1.7 ppm                 |

The three groundwater monitoring wells were installed in soil borings SB-1 (MW-101), SB-4 (MW-102) and SB-5 (MW-103). Each well is constructed of 2" diameter PVC, with a 10-foot long screened section with 0.01-inch slots. The top of each well is slightly below the ground surface, and each well is covered with a protective steel "road box".

Monitoring well MW-101 is approximately 85 feet downgradient of the former location of the 500-gallon gasoline UST. The bottom of this well was set at a depth of 19 feet bgs. A sand pack was installed around the screened section, from one foot below the well to a depth of 7 feet bgs. A bentonite seal was installed above the sand pack to a depth of 4.5 feet bgs. The protective road box was cemented into place above the bentonite.



Monitoring well MW-102 is approximately 50 feet upgradient of the former location of the 500-gallon gasoline UST. The bottom of this well was set at a depth of 15 feet bgs. A sand pack was installed around the screened section, from one foot below the well to a depth of 3 feet bgs. A bentonite seal was installed above the sand pack to a depth of 2 feet bgs. The protective road box was cemented into place above the bentonite.

Monitoring well MW-103 is within the area formerly occupied by the 500-gallon gasoline UST. The bottom of this well was set at a depth of 12 feet bgs. A sand pack was installed around the screened section, from one foot below the well to a depth of 1.5 feet bgs. A bentonite seal was installed above the sand pack to a depth of 1 foot bgs. The protective road box was cemented into place above the bentonite.

Groundwater samples were collected from these three monitoring wells on December 6, 1996. Two quality control samples (a duplicate sample from MW-3 and a field blank) were also prepared at this time. The samples were collected using disposable bailers, and were placed on ice in a cooler immediately after collection. The samples were delivered to Green Mountain Laboratory in Middlesex, Vermont where they were analyzed for aromatic hydrocarbons using EPA Method 8020 and for total petroleum hydrocarbons using EPA Method 8015. The laboratory report for these groundwater samples is included in Appendix A. A summary of the reported laboratory results is presented in the following table.

**NORTHERN STAR/BURKE MOUNTAIN SKI AREA, BURKE, VT**  
**FORMER 500-GALLON GASOLINE UST AREA**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
(all units are parts per billion)

| ANALYTE   | MW-101            | MW-102 | MW-103 | MW-100<br>(MW-103<br>DUPLICATE) | TRIP<br>BLANK | ENFORCEMENT<br>STANDARD <sup>1</sup> |
|---|-------------------|--------|--------|---------------------------------|---------------|--------------------------------------|
| Benzene   | ND <sup>2</sup>   | ND     | 86     | 73                              | ND            | 5                                    |
| Toluene   | BPQL <sup>3</sup> | 1      | 110    | 100                             | 3.2           | 2,420                                |
| Ethylbenzene  | ND                | ND     | 1.9    | 1.3                             | 1.6           | 680                                  |
| Xylenes   | ND                | ND     | 420    | 540                             | 9.7           | 400                                  |
| MTBE <sup>4</sup>   | ND                | 13     | 2,400  | 2,300                           | ND            | 40                                   |
| Total<br>Petroleum<br>Hydrocarbons  | ND                | ND     | 4,600  | 3,900                           | NA            | NA                                   |
| <sup>1</sup> From Vermont Groundwater Protection Rule and Strategy<br><sup>2</sup> ND - Not Detected<br><sup>3</sup> BPQL - Below Practical Quantitation Limit<br><sup>4</sup> MTBE - methyl tertiary butyl ether |                   |        |        |                                 |               |                                      |

The results of the soil sample headspace screening and the groundwater analysis indicate that the contamination to the groundwater in this area is limited in horizontal extent to a relatively small area near the former location of the 500-gallon gasoline UST. Additionally, the presence of the sandy clay loam restrictive layer in the soils provides a barrier that has significantly limited the vertical movement of the contaminants.

Only the groundwater sample collected from the immediate former area of the UST was reported to contain significant levels of contamination. For the sample from monitoring well MW-3, the laboratory report indicates that benzene, xylenes and methyl tertiary butyl ether (MTBE) are all above their respective enforcement standards presented in the Vermont Groundwater Protection Rule and Strategy. Although there is no published enforcement standard for total petroleum hydrocarbons, the levels seen in the samples from monitoring well MW-103 (4,600 ppb or 4.6 ppm and 3,900 ppb or 3.9 ppm) are below the levels that the Vermont Department of Environmental Conservation Waste Management Division (WMD) normally considers unacceptably high for a site in a non-residential setting.

Due to the limited extent of the contamination in this area, and the lack of any nearby sensitive receptors, there is no apparent risk of adverse impacts to sensitive receptors caused by this soil and groundwater contamination.

#### *2.2.3.1 Groundwater Elevation Measurement and Flow Direction*

The relative elevations of the tops of the groundwater monitoring well casings were measured using an auto-level on the date of sampling. The depth to groundwater in each well was also measured on the same date, using an electronic water level indicator. The water level indicator allowed us to also determine if free product was present in any of the wells, and to measure the thickness of any product that was present (no free product was encountered in any well). These data were used to determine the direction of groundwater flow in the study area.

The data suggest that the groundwater on December 6, 1996 was flowing in a generally northerly direction. Based on the landscape in this area, which generally slopes relatively steeply to the north, with Burke Mountain to the immediate south, the measured northerly direction of groundwater flow is consistent with the landscape.

### **3.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **3.1 PHASE II ENVIRONMENTAL SITE ASSESSMENT**

##### **3.1.1 Snow-making Building**

Residual soil contamination near the snow making building appears to be of limited extent. Based on the five drilling rig borings and the three hand auger borings that were completed in this area, the contaminated soils appear to be limited in horizontal extent to a narrow area immediately north of the snow-making building. A temporary man-made snow making pond is approximately 30 feet north of the building. This pond will be taken out of use and filled to the surrounding grade in the near future, as improvements to the snow-making operation at the ski area will result in a new water supply, making the pond obsolete.

The groundwater sampling and analysis completed in this area indicates that the groundwater is relatively free from contamination near the margins of the contaminated zone. Due to damage by heavy equipment, it was not possible to collect a groundwater sample near the apparent center of this zone. By comparing PID soil sample headspace results from the boring completed near the apparent center (SB-8/MW-105) and the boring completed 44 feet to the east (SB-6/MW-104), where a "clean" groundwater sample was obtained, it is possible to make some reasonable assumptions about the likelihood of groundwater contamination in the area of SB-8/MW-105. The comparison of the PID data is as follows:

| <u>DEPTH</u> | <u>PID RESULTS SB-6</u> | <u>PID RESULTS SB-8</u> |
|--------------|-------------------------|-------------------------|
| 1-3 feet     | 46 ppm                  | 85 ppm                  |
| 5-7 feet     | 5.4 ppm                 | 52 ppm                  |
| 10-12 feet   | 19.6 ppm                | 33 ppm                  |

As the data show, the PID headspace results from SB-8 are somewhat higher than the results from SB-6, but they are not so different that one would expect a tremendous difference in the results of groundwater analysis from the two borings. As we know, the results of the groundwater analysis from SB-6/MW-104 indicate that aromatic hydrocarbons and total petroleum hydrocarbons are below laboratory quantitation limits. We believe that, in light of the relatively old nature of this past release of fuel oil, the data that would be resultant of groundwater analysis from SB-8 would likely not provide results that exceed Vermont groundwater enforcement standards. Since the presumed source of this release (the compressors that were formerly stored in this area) has been removed, we recommend no further investigation or remediation of this area.

### 3.1.2 Poma Platter Ski Lift

The soil screening near the base of the Poma Platter ski lift indicates that limited residual soil contamination is present in this location. The source of the contamination is believed to be lubricating oil from an old gear box that has since been replaced. The leaking that occurred in

the past from this gear box has been corrected. The apparent limited nature of this release, and the lack of sensitive receptors at risk, combined with the recent equipment upgrades, indicate that there is no need to further investigate this area. Additionally, concerns for the structural stability of the lift tower make backhoe excavations or other types of excavations in this area inadvisable. We do not recommend any additional investigation of this area. We recommend that the residual soil contamination be left in place, where it will undergo natural attenuation.

## 3.2 UNDERGROUND STORAGE TANKS

### 3.2.1 UST Investigations

The investigation of the three UST on the property determined that soil contamination is not present around the 10,000-gallon fuel oil UST at the Base Lodge. The conditions encountered around this UST, and the visual inspection of the exterior portions of the UST that were exposed by the backhoe excavations, indicate that leaking from this tank is not occurring. We do not recommend the removal of this UST at this time.

As described earlier, the 500-gallon gasoline UST and the 3,000-gallon diesel fuel were removed, and the soils around these UST were assessed as required by the Vermont UST Regulations. Our conclusions and recommendations regarding these UST removals is provided below, under Section 3.2.

### 3.2.2 3,000-gallon Diesel UST Closure

As indicated in the attached UST removal assessment report (Appendix B), the conditions encountered around and under this UST suggest that minor releases of diesel fuel have occurred from piping and possibly a pump associated with the UST, but that there is no widespread soil contamination under the UST. We do not recommend any additional investigation or remediation at this location. No sensitive receptors are located near this area, and the source of the diesel releases has been removed. The very small amount of soil contamination in this area will be naturally attenuated.

### 3.2.3 500-gallon Gasoline UST Closure

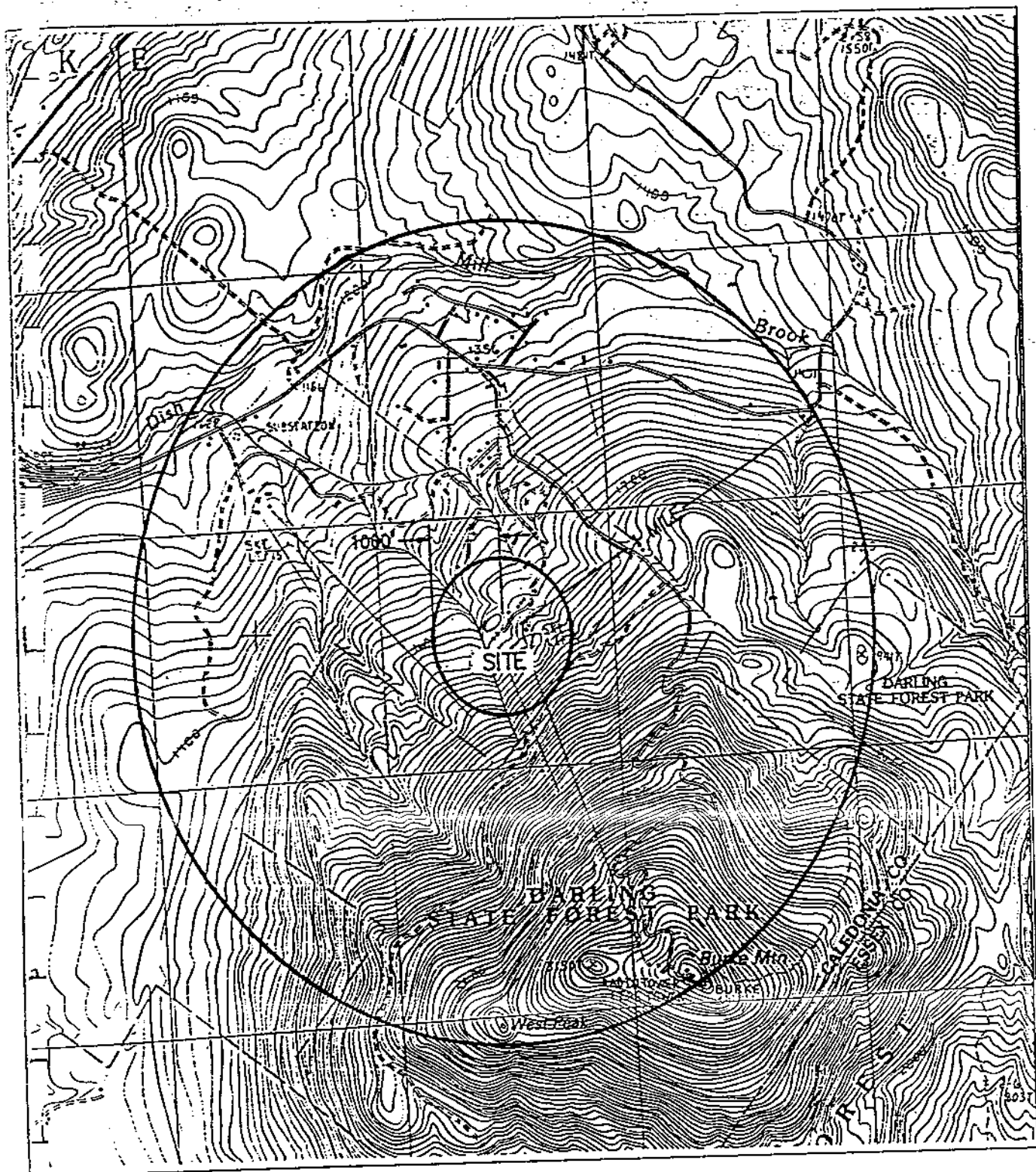
The soil and groundwater investigation of this area following the UST removal has helped us to determine the extent of the contamination at this location. The soil and groundwater contamination here are limited in extent to a relatively small area near the former location of the UST. The only reported groundwater contamination from this UST release that exceeds the Vermont Groundwater Enforcement Standards is from a monitoring well installed directly in the former location of the UST. Concentrations of benzene (86 ppb), xylenes (420 ppb) and MTBE (2,400 ppb) in the groundwater sample from this well (MW-103) are reported to exceed the Vermont Groundwater Enforcement Standards of 5 ppb for benzene, 400 ppb for xylenes and 40 ppb for MTBE.

No sensitive receptors are at risk of adverse impact from this localized zone of contamination. The source of the contamination has been removed. Over time, the levels of contaminants will be reduced by natural attenuation.

We recommend that in order to monitor the contamination in the groundwater at the site, groundwater samples be collected from MW-101 and MW-103 in the spring of 1997 and the fall of 1997. This data should do two things: 1) help establish a decreasing trend in the concentrations of contaminants at the former location of the UST, and 2) provide data that monitors the potential downgradient migration of the contaminant plume. After two sets of data have been obtained, we recommend that the data be used to determine if additional sampling is necessary.

## Figures





4SE MAP: USGS 7.5 Minute Topographic Quadrangle Burke Mountain, VT. 1983

Figure 1: Site Location Map  
Northern Stor/Burke Mountain Ski Area  
East Burke, Vermont

**THE JOHNSON COMPANY, INC.**  
Environmental Sciences and Engineering  
100 STATE STREET  
MONTPELIER, VT 05602



**KEY**

UTILITY POLE

SB-6  
SOIL BORING

MW104  
MONITORING WELL

SS-4  
SOIL SAMPLE



NOT TO SCALE

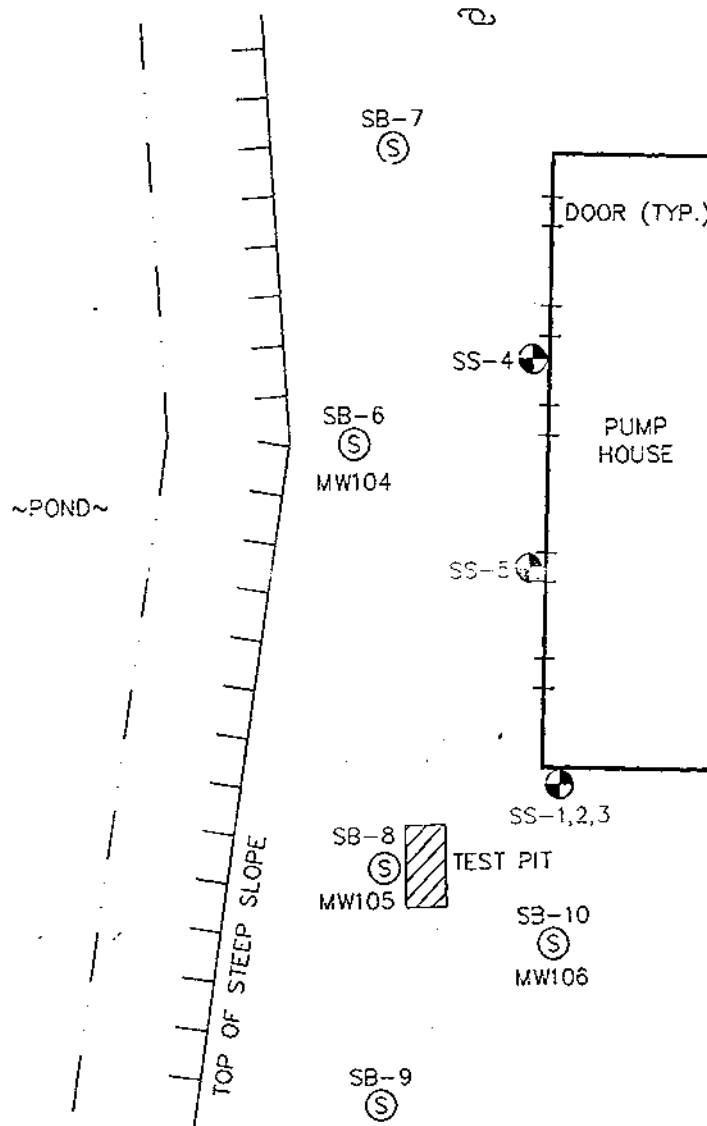


FIGURE 2 - SITE SKETCH  
SNOW-MAKING BUILDING AREA  
BURKE MOUNTAIN, VERMONT

**THE JOHNSON COMPANY, INC.**  
*Environmental Sciences and Engineering*  
100 STATE STREET  
MONTPELIER, VT 05602

KEY

△ 1" MARKER STAKE

⊕ UTILITY POLE

SB-1  
⊙ SOIL BORING

MW101 MONITORING WELL

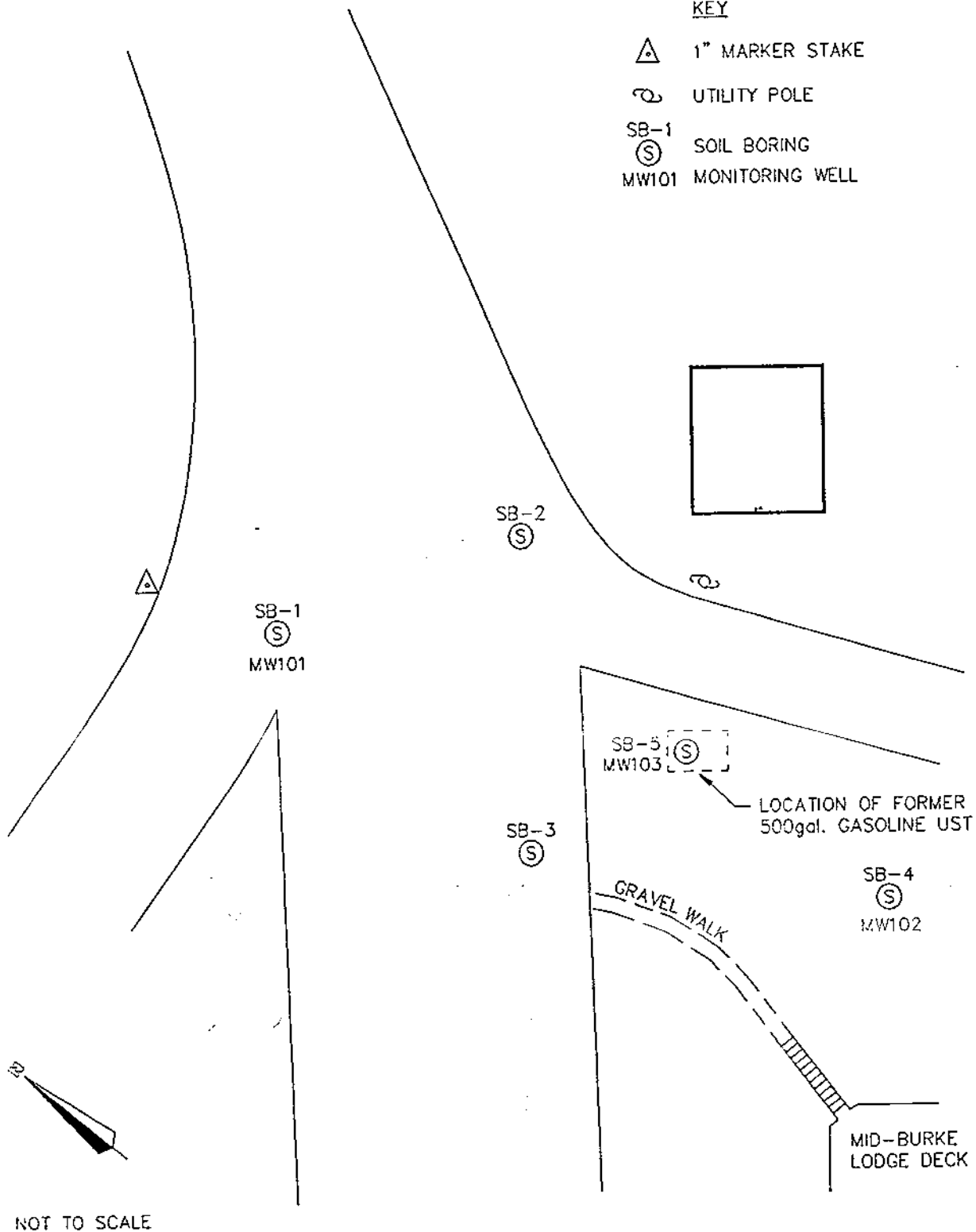


FIGURE 3 - SITE SKETCH  
FORMER GASOLINE UST  
BURKE MOUNTAIN, VERMONT

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*Environmental Sciences and Engineering*  
100 STATE STREET MONTPELIER, VT 05602

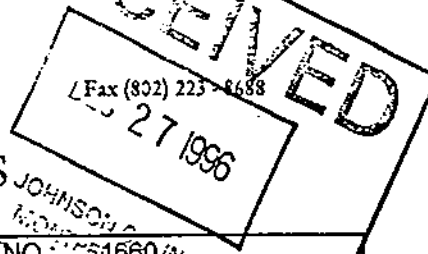
Appendix A  
Laboratory Analytical Report

# GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210  
Montpelier, Vermont 05602

Phone (852) 223-1468

## LABORATORY RESULTS



|                  |                          |                   |                     |
|------------------|--------------------------|-------------------|---------------------|
| CLIENT NAME:     | The Johnson Company      | REFERENCE NO:     | 1660/VC             |
| ADDRESS:         | 100 State Street         | PROJECT NO.:      | 3-0208-1            |
|                  | Montpelier, VT 05602     | DATE OF SAMPLE:   | 12/06/96            |
| SAMPLE LOCATION: | Northern Star/Burke Mtn. | DATE OF RECEIPT:  | 12/09/96            |
| SAMPLER:         | Bradley Wheeler          | DATE OF ANALYSIS: | 12/11/96 - 12/12/96 |
| ATTENTION:       | Bradley Wheeler          | DATE OF REPORT:   | 12/17/96            |

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing Calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analyte to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Mikhail Lunskiy, Ph.D.  
Director, Chemical Services

# GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210  
Montpelier, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: MW-101  
ANALYSIS DATE: 12/11/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | ND           |
| Toluene           | 1          | BPQL         |
| Ethylbenzene      | 1          | ND           |
| m+p-Xylene        | 2          | ND           |
| o-Xylene          | 1          | ND           |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | ND           |

Surrogate % Recovery: 114 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

# GREEN MOUNTAIN LABORATORIES, INC.

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## LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: MW-102  
ANALYSIS DATE: 12/12/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | ND           |
| Toluene           | 1          | 1            |
| Ethylbenzene      | 1          | ND           |
| m+p-Xylene        | 2          | ND           |
| o-Xylene          | 1          | ND           |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | ND           |

Surrogate % Recovery: 112 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

# GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210  
Montpelier, Vermont 05602

Phone (802) 223 - 1468

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## LABORATORY RESULTS

### GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: MW-103  
ANALYSIS DATE: 12/12/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | 86           |
| Toluene           | 1          | 110          |
| Ethylbenzene      | 1          | 1.9          |
| m+p-Xylene        | 2          | 210          |
| o-Xylene          | 1          | 210          |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | 2400*        |

Surrogate % Recovery: 120.6 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

\*Sample was rerun at a higher dilution to bring the concentration of MTBE within the concentration range.

# GREEN MOUNTAIN LABORATORIES, INC.

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Fax (802) 223 - 8688

## LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: MW-104  
ANALYSIS DATE: 12/12/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | ND           |
| Toluene           | 1          | ND           |
| Ethylbenzene      | 1          | ND           |
| m+p-Xylene        | 2          | BPQL         |
| o-Xylene          | 1          | ND           |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | ND           |

Surrogate % Recovery: 110 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits



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## LABORATORY RESULTS

### GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: MW-106  
ANALYSIS DATE: 12/12/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | ND           |
| Toluene           | 1          | ND           |
| Ethylbenzene      | 1          | ND           |
| m+p-Xylene        | 2          | ND           |
| o-Xylene          | 1          | ND           |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | ND           |

Surrogate % Recovery: 112 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

# GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210  
Montpelier, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: MW-100  
ANALYSIS DATE: 12/12/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | 73           |
| Toluene           | 1          | 100          |
| Ethylbenzene      | 1          | 1.3          |
| m+p-Xylene        | 2          | 290*         |
| o-Xylene          | 1          | 250*         |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | 2300*        |

Surrogate % Recovery: 123.4 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

\* Sample was rerun at a higher dilution to bring the concentrations of the indicated compounds within the calibration range.

# GREEN MOUNTAIN LABORATORIES, INC.

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Montpelier, Vermont 05602

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Fax (802) 223 - 8688

## LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. #: 1660  
STATION: FB  
ANALYSIS DATE: 12/12/96  
DATE SAMPLED: 12/06/96  
SAMPLE TYPE: WATER

| PARAMETER         | PQL (µg/L) | Conc. (µg/L) |
|-------------------|------------|--------------|
| Benzene           | 1          | ND           |
| Toluene           | 1          | 3.2          |
| Ethylbenzene      | 1          | 1.6          |
| m+p-Xylene        | 2          | 9.7          |
| o-Xylene          | 1          | 1.8          |
| Chlorobenzene     | 1          | ND           |
| m-Dichlorobenzene | 1          | ND           |
| p-Dichlorobenzene | 1          | ND           |
| o-Dichlorobenzene | 1          | ND           |
| MTBE              | 5          | ND           |

Surrogate % Recovery: 113 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

# Green Mountain Laboratories, Inc.

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Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

## LABORATORY RESULTS

|                  |                          |                   |          |
|------------------|--------------------------|-------------------|----------|
| CLIENT NAME:     | The Johnson Company      | REF #:            | 1660     |
| ADDRESS:         | 100 State Street         | PROJECT NO.:      | 3-0208-1 |
|                  | Montpelier, VT 05602     |                   |          |
| SAMPLE LOCATION: | Northern Star/Burke Mtn. | DATE OF SAMPLE:   | 12/06/96 |
| SAMPLER:         | Bradley Wheeler          | DATE OF RECEIPT:  | 12/09/96 |
|                  |                          | DATE OF ANALYSIS: | 12/19/96 |
| ATTENTION:       | Bradley Wheeler          | DATE OF REPORT:   | 12/26/96 |

### Total Petroleum Hydrocarbons (TPH) Results by EPA Modified 8100

| Sample | Result (mg/l-ppm)* |
|--------|--------------------|
| MW-104 | < 0.5              |
| MW-106 | <0.5               |

\* Carbon Range C9-C40 - Fuel (Diesel) and Lubricating Oil Range Organics.

Reviewed by:



Chemical Services

# Green Mountain Laboratories, Inc.

RR#3 Box 5210

Montpelier, Vermont 05602

Phone (802) 223-1468 Fax (802) 223-8688

## LABORATORY RESULTS

|                  |                           |                   |                   |
|------------------|---------------------------|-------------------|-------------------|
| CLIENT NAME:     | The Johnson Company, Inc. | REF #:            | 1660              |
| ADDRESS:         | 100 State Street          | PROJECT NO.:      | 3-208-1           |
|                  | Montpelier, VT 05602      |                   |                   |
| SAMPLE LOCATION: | Northern Star/Burke Mtn.  | DATE OF SAMPLE:   | 12/06/96          |
| SAMPLER:         | Bradley A. Wheeler        | DATE OF RECEIPT:  | 12/09/96          |
|                  |                           | DATE OF ANALYSIS: | 12/11/96-12/12/96 |
| ATTENTION:       | Bradley A. Wheeler        | DATE OF REPORT:   | 12/17/96          |

### Total Petroleum Hydrocarbons (TPH) Results by EPA Method 8015

| Sample | Result (mg/L) | ** PQL (mg/L) |
|--------|---------------|---------------|
| MW 101 | ND*           | 0.1           |
| MW 102 | ND*           | 0.1           |
| MW 103 | 4.6           | 0.1           |
| MW 100 | 3.9           | 0.1           |

\*ND = Not Detected

\*\* PQL = Practical Quantitative Limit

Reviewed by:



Mikhail Lunskiy, Ph.D.

Director, Chemical Services

## CHAIN OF CUSTODY RECORD

No 2079

| Client/Project Name<br><i>Northern Star/Burke Mtn.</i>                          |         |       | Project Location<br><i>E. Burke</i> |   |               | ANALYSES<br><br><i>8020</i><br><i>8015</i><br><i>8100</i><br><i>LBW 1750</i><br><br><i>1660</i> |   |  |  |                |                         |
|---|---------|-------|-------------------------------------|---|---------------|---|---|--|--|----------------|-------------------------|
| Project No.<br><i>S-0208-1</i>  |         |       | Field Logbook No.<br>_____          |   |               |   |   |  |  |                |                         |
| Sampler: (Signature)<br><i>Lucy A. Wheeler</i>                                  |         |       | Chain of Custody Tape No.<br>_____  |   |               |   |   |  |  |                |                         |
| Sample No./ Identification  | Date    | Time  | Lab Sample Number                   | Type of Sample  |               |   |   |  |  |                | REMARKS                 |
| MW 101  | 12/6/96 | 10:40 |                                     | water   | X             | X   |   |  |  |                | (2) 40 ml. vials        |
| MW 102  |         | 11:05 |                                     |   | X             | X   |   |  |  |                |                         |
| MW 103  |         | 11:45 |                                     |   | X             | X   |   |  |  |                |                         |
| MW 104  |         | 14:35 |                                     |   | X             |   | X |  |  |                | (plus) amber for incand |
| MW 106  |         | 15:15 |                                     |   | X             |   | X |  |  |                |                         |
| MW 100  |         | 10:00 |                                     |   | X             | X   |   |  |  |                |                         |
| FB  | V       | 11:15 |                                     |   | X             |   |   |  |  |                |                         |
| Relinquished by: (Signature)<br><i>Lucy A. Wheeler</i>                          |         |       |                                     | Date<br>12/9/96   | Time<br>10:42 | Received by: (Signature)<br><i>[Signature]</i>  |   |  |  | Date<br>1/4/97 | Time<br>10:47           |
| Relinquished by: (Signature)  |         |       |                                     | Date  | Time          | Received by: (Signature)  |   |  |  | Date           | Time                    |
| Relinquished by: (Signature)  |         |       |                                     | Date  | Time          | Received for Laboratory: (Signature)  |   |  |  | Date           | Time                    |
| Sample Disposal Method:   |         |       |                                     | Disposed of by: (Signature)   |               |   |   |  |  | Date           | Time                    |
| SAMPLE COLLECTOR  |         |       |                                     | ANALYTICAL LABORATORY   |               |   |   |  |  |                |                         |
| 5 State Street<br>Montpelier, VT 05602<br>(802) 229-4600<br>Fax: (802) 229-5876 |         |       |                                     | THE JOHNSON COMPANY, INC.<br>Environmental Sciences and Engineering |               |   |   |  |  |                |                         |

## Appendix B

### Ust Closure Forms and Assessment Report

THE JOHNSON COMPANY, INC.

**Environmental Sciences and Engineering**

November 15, 1996

Mr. Tim McNamara  
Vermont Department of Environmental Conservation  
Underground Storage Tank Program  
103 South Main Street  
Waterbury, Vermont 05671-0404

Re: UST Removals at Northern Star/Burke Mountain Ski Area  
East Burke, Vermont  
JCO #3-0208-1 (054)

Dear Tim:

As per your approval given on October 30, 1996, two underground storage tanks (UST) were removed on November 12, 1996 from the referenced property. These UST included one 500-gallon gasoline UST and one 3,000-gallon diesel fuel UST. The Vermont Department of Environmental Conservation Underground Storage Tank (DEC UST) Program UST Permanent Closure Form for these UST removals is attached. This report describes the conditions encountered during the removal of these UST.

## 1.0 UNDERGROUND STORAGE TANK CLOSURES

Great Northern Environmental Services was hired to excavate, clean and remove the UST. Approximately 150 gallons of waste diesel fuel and water was pumped from the diesel UST and 5 to 10 gallons of waste gasoline and water was pumped from the gasoline UST. The Johnson Company was present on behalf of Northern Star Ski Corporation, property owner, to complete the site assessments for the UST removals.

### 1.1 500-GALLON GASOLINE UST

Excavation of the gasoline UST began at approximately 9:15 AM. This UST is located at the northeast end of the parking area below the Mid-Burke Lodge. As this UST was uncovered and subsequently excavated, the soils that were removed from above and beside the UST were continuously screened with an HNU Model P101 photoionization detector (PID). The PID was calibrated on the morning of the site work, using 58 ppm isobutylene gas. The observed soil materials consist primarily of gravelly sand backfill and silt loam subsoil. Screening of the soils that were excavated above and beside this UST produced PID headspace readings ranging from less than 1 part per million (ppm) to 28 ppm. Readings from beneath the UST in general were in the 50 to 130 ppm range.

Soil samples from approximately 10 feet below the ground surface (bgs) from a silt loam layer at the bottom of the excavation area produced PID headspace readings of less than 1 ppm. The soil layer immediately above this silt loam layer is fine sand in texture, and a sample of this material within six inches of the silt loam sample produced a PID headspace reading of 67 ppm. It is apparent that this silt loam layer is restrictive to the vertical migration of the gasoline released from this UST.



Three exploratory borings were conducted directly downslope of this UST to determine if the contamination evident in the excavation for the UST had migrated significantly from the area of the UST. Soil samples from as far as 35 feet from the excavation, at a depth of 2 feet bgs, were determined to be contaminated at levels as high as 33 ppm. Based on the widespread nature of the contaminated soils at this area, and the likelihood that the contaminated soils interact with the seasonal high water table (which was not apparent on November 12, 1996), it was determined that it would not be feasible to attempt to excavate the contaminated soils for polyencapsulation or off-site disposal. All excavated soils were replaced into the UST excavation and exploratory excavations.

Neither groundwater or bedrock were encountered in the excavation.

## 1.2 3,000-GALLON DIESEL UST

The 3,000-gallon diesel UST was located at the southwest end of the parking area below the Mid-Burke Lodge, approximately 350 to 375 feet southwest of the gasoline UST described above. With the exception of two very small areas of slight soil contamination, the soils around and under this UST appeared to be free from diesel fuel contamination. The two areas mentioned include a very small quantity of soils at the north end of the UST that produced PID headspace results of between 5 and 17 ppm. Within 12 inches beneath the sample that produced the result of 17 ppm, a soil sample produced a PID headspace reading of 0.2 ppm. A small electric pump was installed on top of the UST at this end, and it may be that the leaking evident in this area is a result of releases associated with the pump. The other area where slight soil contamination was evident around this UST was a small area of soils beside the center portion of the UST that produced PID headspace readings of up to 38 ppm. This situation appeared to be a result of minor leaking from piping that carried the fuel to a compressor that was formerly set up near the UST. The soils directly under the UST in this location produced PID headspace results of 0.6 ppm.

These small areas of soil were not removed from the excavation. Due to their small quantity and low concentrations, and because they do not present a risk to any sensitive receptors, it was determined that leaving them in-place to attenuate naturally was the most reasonable response for these soils.

## 2.0 UST CLOSURE SUMMARY

The conditions of these UST were good, with slight rusting and no visible holes.

There are no buildings nearby that are in a position to be threatened by the migration of soil vapors from either of these UST. Water supply for this area is by private wells. The closest well to these UST closures is approximately 400-600 feet north of the former gasoline UST location. A small stream is approximately 150 feet northeast of the former gasoline UST location. It does not appear that the contamination evident around either of these UST is impacting or is likely to impact any sensitive receptors, but the potential for impacts to the stream near the former gasoline UST location will be further assessed, as described below.

### 3.0 RECOMMENDATIONS

The Johnson Company recommends additional characterization of the soil and groundwater near the former gasoline UST. We recommend that a sufficient number of soil borings be conducted in this area to determine the degree and extent of the soil contamination, and that up to three groundwater monitoring wells be installed in this area to determine the degree and extent of groundwater contamination. Soil samples will be screened with a PID using a plastic bag headspace screening method, and groundwater samples will be analyzed at a laboratory for benzene, toluene, ethylbenzene, xylenes, methyl tertiary butyl ether using EPA Method 8020 and for total petroleum hydrocarbons using EPA Method 8015.

Several groundwater monitoring wells were installed on the property by TWM Northeast during a 1990 Phase II Environmental Site Assessment. If the use of any of these wells is appropriate and feasible, they will be included in the site characterization for this UST. This additional characterization will include a survey of sensitive receptors to assess the potential for impacts to water supply wells, surface water, wetlands and basements of buildings.

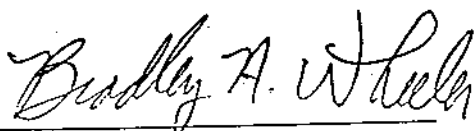
An Expressway Notification form is attached for this work. A report documenting the findings of this investigation will be submitted to the Sites Management Section within 60 days.

Please call if you have any questions regarding these UST removals.

Sincerely,

THE JOHNSON COMPANY, INC.

By:



Bradley A. Wheeler, CPSS  
Senior Scientist

attachments

cc: Dixi Nohl, Northern Star/Burke Mountain Ski Area



# State of Vermont

Department of Fish and Wildlife  
Department of Forests, Parks and Recreation  
Department of Environmental Conservation  
State ecologist  
TDD SERVICE FOR THE HEARING IMPAIRED  
800-253-0191 TDD/Voice  
800-253-0195 Voice/TDD

AGENCY OF NATURAL RESOURCES  
Department of Environmental Conservation  
Waste Management Division  
103 South Main Street/West Office  
Waterbury, Vermont 05671-0404  
(802) 241-3888  
FAX (802) 241-3296

## SITE INVESTIGATION EXPRESSWAY NOTIFICATION

Site Owner: Northern Star Ski Corporation

Site Name, Town: Northern Star/Burke Mountain Ski Area, East Burke, VT

☒ Yes, this site will participate in the Site Investigation Expressway Process.

☐ No, this site will not participate in the Site Investigation Expressway Process.

If yes, please complete the checklist below:

☒ Contamination present in soils above action levels ☒ Yes ☐ No

If yes, summarize levels:

PID Headspace screening of soils to 10' bgs ranged from 50 to 130 ppm typically.

☒ Free product observed ☐ Yes ☒ No

☒ Groundwater contamination observed ☐ Yes ☒ No - it is expected that seasonal fluctuation is into contaminated zone

☒ Surface water contamination observed ☐ Yes ☒ No

☒ Suspected release of hazardous substances ☐ Yes ☒ No

If yes, please explain:

\_\_\_\_\_

☒ Affected receptors ☒ Yes ☐ No

If yes, please identify receptors including names and addresses of third party receptors:

Soils, possibly groundwater

\_\_\_\_\_

Please provide an estimated date of when you expect to submit Site Investigation Report: January 25, 1997

Chlorine Free 100% Recycled Paper

Regional Offices - Barre/Essex Jct/Frisford/Frutland/N. Ferrisburgh/St. Johnsbury

*Bradley A. Wheeler*

*The Johnson Company, Inc.*

# UNDERGROUND STORAGE TANK PERMANENT CLOSURE FORM

## AGENCY USE ONLY

Sched. closure date: \_\_\_\_\_  
 Facility Town: \_\_\_\_\_  
 Facility ID#: \_\_\_\_\_  
 DEC Official: \_\_\_\_\_  
 Evaluated by: \_\_\_\_\_

VERMONT AGENCY OF NATURAL RESOURCES  
 DEPT. OF ENVIRONMENTAL CONSERVATION  
 HAZARDOUS MATERIALS MANAGEMENT DIV.  
 103 SOUTH MAIN STREET, WEST BUILDING  
 WATERBURY, VERMONT 05671-0404  
 TELEPHONE: (802) 241-3888

Company conducting  
 site assessment: Johnson Co.  
 Person conducting  
 site assessment: Brad Wheeler  
 Telephone number of  
 company (or person): 229-4600  
 Date of UST closure: 11/12/96  
 Date of site assessment: 11/12/96

This Closure Form may only be used for the facility and date indicated in the upper left hand corner. Changes in the scheduled closure date should be phoned in at least 48 hours in advance. Both the yellow and white copies must be returned to the above address; the pink copy should be retained by the UST owner. A written report from an environmental consultant covering all aspects of closure and site assessment, complete with photographs and any other relevant data, must accompany this form. All procedures must be conducted by qualified personnel - including training required by 29 CFR 1910.120. Documentation of all methods and materials used must be adequate. All work must be performed in compliance with DEC policy "UST Closure and Site Assessment Requirements" as well as all applicable statutes, regulations, and additional policies. The DEC may reject inadequate closure forms and reports.

## Section A. Facility Information:

Name of Facility: Northern Star/Burke Mtn. Ski Area Number of Employees: \_\_\_\_\_  
 Street address of facility: East Burke, VT / P.O. Box 247  
 Owner of UST(s) to be closed: Northern Star Ski Corporation  
 Name of Contact and telephone number if different from owner: Dixi Nohl 626-1317  
 Mailing address of owner: above  
 Telephone number of owner: above

## Section B. UST Closure Information: (please check one)

Reason for initiating UST Closure: ☒ Suspected Leak ☐ Liability ☒ Replacement ☐ Abandoned  
 Which portion of UST is being closed: ☐ Tanks ☐ Piping ☐ Tanks & Piping  
 USTs undergoing permanent closure. Include condition and if leaks were found:

| UST# | Product  | Size (gallons) | Tank age | Tank condition | Piping age | Piping condition |
|------|----------|----------------|----------|----------------|------------|------------------|
| 1    | gasoline | 500            | unknown  | good           | unknown    | good             |
| 2    | diesel   | 3,000          | unknown  | good           | unknown    | good             |
|      |          |                |          |                |            |                  |
|      |          |                |          |                |            |                  |

Which tanks, if any, will be closed in-place (must have approval from DEC) \_\_\_\_\_  
 Disposal/destruction of removed UST(s): \_\_\_\_\_  
 Location Leak Oil Service Date 11/12/96 Method Scrap metal Date 1/1

Amount (gal.) and type of waste generated from USTs: 150-diesel/water ; 5-10-gas/water  
 Tank cleaning company (must be trained in confined space entry): Leak Oil Service - Great Northern Env. Services  
 Certified hazardous waste hauler (tank contents are hazardous waste unless recovered and usable product): same  
 Hazardous waste generator ID number: \_\_\_\_\_

USTs not closed. This portion must be filled in to include all USTs, regardless of size, and status, \*whether "abandoned", "in use", "to be installed", or "not aware of any other tanks on-site". Remember: most new installations require permits and advance notice to this office.

| UST# | Product | Size (gallons) | Tank age | *Tank Status | Piping Age | *Piping Status |
|------|---------|----------------|----------|--------------|------------|----------------|
|      |         |                |          |              |            |                |
|      |         |                |          |              |            |                |
|      |         |                |          |              |            |                |
|      |         |                |          |              |            |                |

## Section C. Initial site characterization:

Work in this section must be completed by a professional environmental consultant or hydrogeologist with experience in environmental sampling for the presence of hazardous materials. A full report from the consultant must accompany this form.  
 Excavation size (ft): Gas - 60 Diesel - 300 Excavation depth (ft): 10' Soil type: fine sand/silt/loam Bedrock depth (ft): >10'  
 PID Information: Make: HNU Model: P101

PID Calibration information: Date 11/12/96 Time 9:00 Type of Gas 58 ppm isobutylene  
Contamination detected with PID (ppm): Peak 127 Depth of peak (ft) 5' Avg 40 - for gas UST,  
Soil samples collected for laboratory analysis? Yes        # of samples        No X typically <1 for  
(show locations and depth of all readings and samples on diagram). diesel UST

Have soils been polycapsulated on site? Yes        list amount (cu. yds.):        No X  
Have any soils been transported off site? Yes        list amount (cu. yds.):        No X

Location transported to:        Date: 1/1

Name of DEC official granting approval to transport soils:       

Amount of soils backfilled. (cu. yds.): 5-10 yds<sup>3</sup> Avg. PID 40 ppm

Have limits of contamination been defined? Yes        No X

Are you aware of any other contaminants which may be present? Yes        No X

Comments:       

Free phase product encountered? Yes        thickness        No X

Groundwater encountered? Yes        depth(ft)        No X

Were there existing monitoring wells on site? Yes X (# samples taken       ) No       

Have new monitoring wells been installed? Yes        (# samples taken       ) No X

Samples collected from monitoring wells for lab analysis? Yes        No X

(include well location, benchtop readings, and laboratory results if applicable in a separate report and on the site diagram)

Is there a water supply well or spring on site? Yes X (check type: shallow        rock X spring       ) No       

How many public water supply wells are located within a 0.5 mile radius? 4 min. distance (ft): 400-600'

How many private water supply wells are located within a 0.5 mile radius? 8 min. distance (ft): 400-600'

What receptors have been impacted? X soil        indoor air X groundwater        surface water        water supply

Section D. Statements of UST closure compliance: (must have both signatures or site assessment not complete)

As the party responsible for compliance with the Vermont UST Regulations and related statutes at this facility, I hereby certify that all of the information provided on this form is true and correct to the best of my knowledge.

Marc Mancini  
Signature of UST owner or owner's authorized representative

Date: 11-12-96

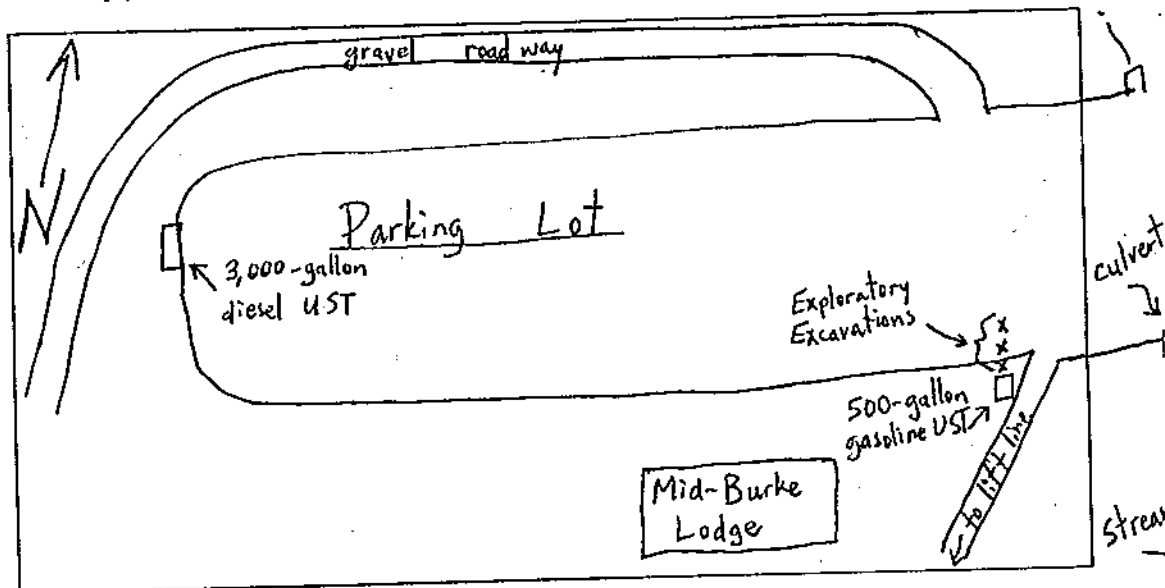
As the environmental consultant on site, I hereby certify that the site assessment requirements were performed in accordance with DEC policy and regulations, and that information which I have provided on this form is true and correct to the best of my knowledge.

Bradley A. Wheeler  
Signature of Environmental Consultant

Date: 11/12/96

#### SITE DIAGRAM

Show location of all tanks and distance to permanent structures, sample points, areas of contamination, potential receptors and any pertinent site information. Indicate North arrow and major street names or route number.



Return form along with complete narrative report and photographs to the Department of Environmental Conservation, Underground Storage Tank Program within 72 hours of closure.